

E X P E R I M E N T S
A N D
O B S E R V A T I O N S
O N T H E
M I N E R A L WAT E R S
O F
P H I L A D E L P H I A , A B I N G T O N ,
A N D B R I S T O L ,

I n t h e P R O V I N C E o f P E N N S Y L V A N I A .

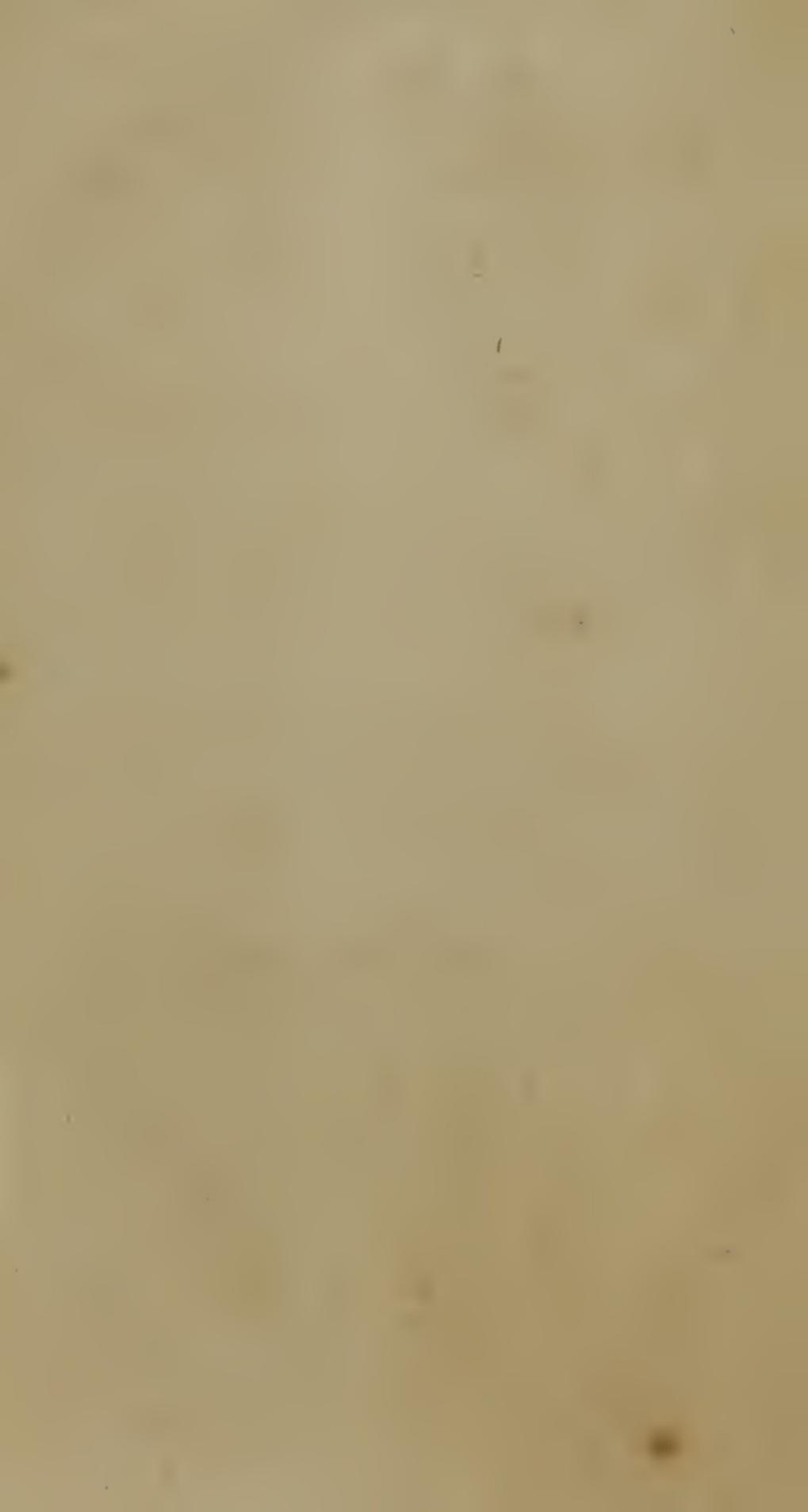
R e a d J u n e 18, 1773, b e f o r e t h e A M E R I C A N P H I L O -
S O P H I C A L S O C I E T Y , held at P H I L A D E L P H I A .

B Y B E N J A M I N R U S H , M . D .
P R O F E S S O R o f C H E M I S T R Y i n t h e C O L L E G E o f
P H I L A D E L P H I A .

*Quæ presenti opusculo defunt, suppleat ætas. Fructum
Studiorum viridem, & adhuc dulcem promi decet; dum
et venia et spes est, & paratus favor, & audere non dedecet.*

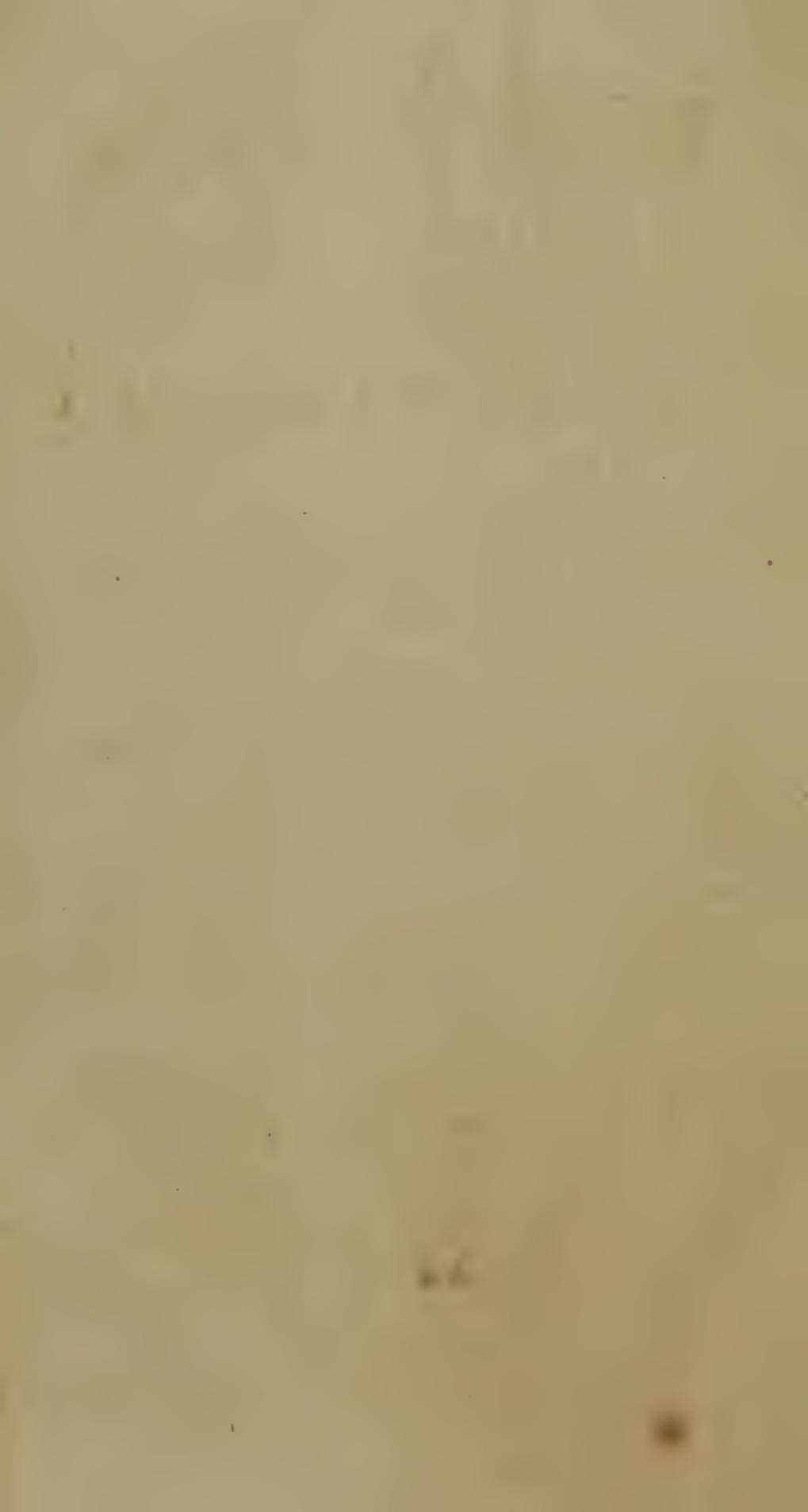
Q U I N T I L I A N .

P H I L A D E L P H I A :
P R I N T E D B Y J A M E S H U M P H R E Y S , J U N I O R ,
I N F R O N T - S T R E E T . M D C C L N X I I I .



TO THE HONOURABLE
RICHARD PENN, ESQUIRE,
LIEUTENANT GOVERNOR
AND
COMMANDER IN CHIEF,
OF THE PROVINCE OF PENNSYLVANIA,
AND OF THE COUNTIES OF
NEW-Castle, KENT AND SUSSEX, ON DELAWARE,
AND PATRON OF THE
AMERICAN PHILOSOPHICAL SOCIETY,
THE FOLLOWING
EXPERIMENTS AND OBSERVATIONS,
AS A SMALL TRIBUTE TO HIS
PUBLIC AND PRIVATE VIRTUES,
ARE INSCRIBED
BY HIS MOST OBEDIENT
AND HUMBLE SERVANT,

E. RUSH



E X P E R I M E N T S
A N D
O B S E R V A T I O N S
O N T H E
M I N E R A L WATERS, &c.

TH E different stages of society, like the different ages of the human body, have their peculiar diseases. In the infancy of all societies, diseases are simple and few in number, but in proportion as they advance in arts and opulence, which always bring along with them the refinements of luxury, diseases multiply, and are complicated in such a manner, as to require more powerful aids than the simple preparations of plants and metals. These aids have been sought for from a variety of sources, but from none oftener than mineral waters. These waters, which have flowed for many years unnoticed by our ancestors, have, of late, attracted the attention of the public, and have now become a very important part of the *materia medica*.

I S H A L L confine the following experiments and observations entirely to the mineral waters of Philadelphia,
Abington

Abington and Bristol. These, from their quality, are equal, and from their situation, justly to be preferred to the many mineral waters, of a like nature, which have been discovered in every part of this province.

I SHALL first give the chemical history of these waters, as discovered by the effects of heat and mixture.

Secondly, I shall mention, in as concise a manner as possible, a few of those diseases in which they are useful: And—

Thirdly, Subjoin directions how to use them.

C H A P. I.

OF THE PHILADELPHIA MINERAL WATER.

THIS water is found in a well, twenty-six feet deep, in Sixth-street, near the corner of Chesnut-street, on a lot of ground belonging to JOHN LAWRENCE, Esq; The water, when it first comes from the pump, has a slight fetid smell, is somewhat turbid, and after standing a few hours exposed to the air, deposits a yellow sediment. The smell of the water is increased by rest.

It has a strong ferruginous taste. Its specific gravity compared with rain water is, as 1000,45 to 1000.

OF THE ABINGTON WATER.

THIS water is found about twelve miles to the north of Philadelphia, on a plantation belonging to Mr. WILLIAM FRENCH. The spring flows near the bottom of a hill that descends with a gentle declivity. The soil around the spring is a yellow reddish clay, with a small mixture of sand. It has a ferruginous taste, and

by

by exposure to the air becomes turbid, and deposits a yellow sediment. Its specific gravity is to rain water, as 1000,90 to 1000.

OF THE BRISTOL WATER.

THIS water is found near the surface of the ground, in the neighbourhood of a soil abounding with black sand. It is transparent, but deposits a yellow sediment after standing a few hours in the open air. When it is put up in bottles, and well corked, it will retain its mineral virtues for many months. It has a ferruginous taste, which is not disagreeable. Its specific gravity is exactly the same as that of rain water.

THESE waters are emetic, purgative, and diuretic, according to the constitution of the patient, or the quantity taken into the stomach. They likewise quicken the pulse, and promote perspiration.

THE following table will show the effects of mixing a variety of substances with these waters. The first column contains an account of the substances which were added; the second, third, and fourth, contain an account of their effects upon the waters.—It will be unnecessary to mention the proportions of each, as the event of the experiments was nearly the same, with very different proportions.

Experiment I.	Philadelphia Water.	Abington Water.	Bristol Water.
Tincture of gall.	A deep purple color.	A dark brown color.	A deep purple.
II.			
Syrup of violets.	A green color.	Ditto.	Ditto.

Experiment

Experiment III.	Philadelphia Water.	Abington Water.	Bristol Water.
Soap and water.	No coagu- lum but a lather.	Ditto.	Ditto.
IV. Skimmed and boiled milk.	No coagu- lum.	Ditto.	Ditto.
V. Tincture of rhubarb.	Yellow, in- clining to an olive color.	Ditto.	
VI. Vitriolic acid.	No change at first, after- wards trans- parent.	Ditto.	No change.
VII. Nitrous acid.	The same as the vitriolic acid.	Ditto.	No change.
VIII. Marine acid.		More trans- parent.	No change.
IX. Spirit of wine.	No change.	Ditto.	Ditto.
X. Spirit of hartshorn.	No efferves- cence, or turbidness, but a light green color.	Ditto.	Ditto.
XI. Spirit of sal ammoniac.		No change.	Ditto.

Experiment

Experiment	Philadelphia Water.	Abington Water.	Bristol Water.
XII. Solution of vegetable alkali.	Green color and small turbidness,	Ditto, with- out a turbid- ness.	Ditto.
XIII. Caustic alkali.	No change.	Ditto.	Ditto.
XIV. Lime water.	A turbid, dark green color.	Ditto, with a precipita- tion.	A light green color.
XV. Solution of sugar of lead.	Great tur- bidness, be- came milky, and after standing sometime de- posited a white preci- pitate.	Ditto.	Ditto, tho' in a less de- gree.
XVI. Solutiōn of lead in the nitrous acid	Turbid and white.		
XVII. Solution of silver in ni- trous acid.	Cloudy, af- terwards purple with a precipitate.	Ditto.	Ditto.
XVIII. Solution of blue vitriol.		No change.	Ditto.

Experiment	Philadelphia Water.	Abington Water.	Bristol Water.
XIX. Solution of corrosive sub- limate.		No change.	Ditto.
XX. Solution of allum.	More trans- parent. After standing for some time a blue cloud floated on the surface.	Ditto.	No change.
XXI. Fixed air from chalk, by vi- trolic acid.	Rendered it (after it had stood for some time and become turbid) clear and transpa- rent.		

ALL these mineral waters deposit a sediment when they are boiled.

LET us next enquire into the nature of the substances contained in each of them.

ONE quart of the Philadelphia water yielded, by evaporation, four grains of solid matter, three of which appeared to be an iron ochre, and one an earthy salt, which diliquesced upon being exposed to the air; upon adding to this salt a pure vegetable alkali, a white powder was precipitated, which had all the properties of magnesia alba; the salt which remained showed all the usual marks of digestive salt. The saline matter found in this water, appears

appears then to be a species of sal ammoniacum fixum, with this difference from the ordinary salt of that name, that the earth which is united with the marine acid, is a magnesia, and not quick-lime.*

ONE quart of the Abington Water yielded two grains of iron ochre, without any sensible mixture of earthy or saline matter; upon evaporating three quarts of this water, half a grain of salt was discovered, mixed with six grains of the iron; this salt, upon examination, appeared to be common salt.

ONE quart of the Bristol Water yielded, by evaporation, two grains of solid matter, one of which was iron, the other had all the properties of common salt.

O B S E R V A T I O N S.

FOR a long time iron was thought to be soluble in water, only by the intervention of an acid. Dr. STAHL taught us, some years ago, that it was soluble by means of an alkali; and Mr. LANE has proved by a number of experiments, published in one of the late volumes of the philosophical transactions, that iron is soluble in water, by the intervention of fixed air; † but that

B z

iron

* See an account of this earthy salt in Dr. LEWIS's Philosophical Commerce of Arts. Page 640.

† Dr. STAHL's method of dissolving iron in an alkali is, by adding a solution of a vegetable alkali, to a solution of iron in the nitrous acid. May not the fixed air contained in the alkali, and which is discharged from it by its uniting with the nitrous acid, be the medium of the iron's solution rather than the alkali?

iron is soluble in simple water, without the aid of any of these matters, is a modern discovery in chemistry. When we examine our experiments properly, we shall find that the iron is dissolved chiefly in this manner, in the waters of Philadelphia, Abington and Bristol.

THE green color produced by the syrup of violets, in Experiments II, is no proof of the presence of an alkali in these waters; for we find the same color from adding it to a solution of Epsom salt, or to a small quantity of the *Æthiops martialis* of Lemery; we find it produced, likewise, from a cold infusion of iron filings in water—This infusion strikes a purple brown color, with an infusion of galls.

THE lather, in Experiments III, from mixing these waters with a solution of soap, is a proof of their freedom from a large quantity of saline and calcarious matters. It is the presence of these substances, in all waters, which renders them hard; another proof of the softness of these waters is, their boiling peas.

THE waters becoming transparent, upon the addition of the vitriolic acid, as in Experiments VI, is owing to the vitriolic acid's attracting and dissolving the iron contained in the waters; no change was produced in the appearance of the Bristol Water, upon the account of its natural transparency.

THE there being no effervescence from mixing these waters with the volatile or fixed alkalies, as in Experiments XI, XII, and XIII, is a proof of their containing no acid.

THE turbidness, &c. from the addition of lime-water, in Experiment XIV, was probably owing to the lime's attracting some fixed air from the mineral waters, which we shall see hereafter exists, in a small quantity, in these waters, particularly in that of Philadelphia.

THE milky appearance and turbidness, in Experiments XV, were owing to a decomposition. The vegetable acid of the sugar of lead attracted the iron, and deposited the lead with which it was before combined.

THE turbidness, in Experiment XVI, was owing to the nitrous acid attracting the iron and letting go the lead, which was before dissolved in it.

THE cloud and precipitation, in Experiments XVII, was likewise owing to the nitrous acids attracting the iron, with a force greater than it did the silver, with which it was formerly united.

THE effect of the solution of allum, in Experiments XX, was owing to the vitriolic acid of the allum (not being fully saturated with clay) attracting and dissolving the iron contained in the waters.

THE proportion of iron found in a given quantity of these, and all chalybeate waters differs: *First*, According to the season of the year; being greatest in cold and dry weather.

Secondly, According to the time in which they are drawn from the spring: And—

Thirdly, According to the degree of calcination the iron has undergone: The more compleatly its principle of inflammability is separated, the more freely it dissolves in water.

THE

THE Philadelphia water, probably, owes its greater proportion of iron, to the presence of a small quantity of fixed air; that this is the case we learn from Experiment XXI. Upon weighing half a pint of the water, likewise, twelve hours after it was drawn from the well, it was found to have lost four grains of its weight. Mr. JAMES HUTCHINSON, Apothecary to the Pennsylvania Hospital, and Student of Medicine in the College of Philadelphia, found the proportion of fixed air to be much greater than this, upon exposing the water to the heat of boiling water. The proportion in this and in the other waters is, however, too small, compared with those chalybeate waters, where the iron is dissolved by fixed air, to suppose that it is the medium of the iron's solution in them.

To what is the peculiar odor of the Philadelphia water owing? It has been ascribed to sulphur; but there are few direct proofs of sulphur being dissolved in a simple state in water.*

I HAVE

* To know whether sulphur was soluble in water by means of fixed air, or the principle of inflammability, I tried the following experiments. I added eight ounces of water to half an ounce of sulphur, and blowed into it for some time. I likewise conveyed, into the same quantity of sulphur and water, some fixed air from an effervescing mixture of chalk and the vitriolic acid, by means of the bended tube, described by Dr. MACBRIDE. After this, I conveyed in the same manner, into the same quantity of sulphur and water, a quantity of the principle of inflammability, from a mixture of iron filings and nitrous acid. Upon examining the water chemically, after each of these experiments, it did not afford a single mark of sulphur.

I HAVE examined some water brought from Caldas da Rainha, in Portugal, which smelt strongly of sulphur, without being able to detect the least particle of sulphur in it. It is no uncommon thing in chemistry, to find an exact resemblance in the odors of bodies, which differ widely from each other in their nature and properties. The sulphureous smell, in most of mineral waters, is probably owing to the escape of the principle of inflammability, or in other words, of that volatile principle, called, by some modern writers, inflammable air.

WE see then, from the foregoing experiments, that these three mineral waters contain iron, dissolved in them, without the intervention of an acid, an alkali, or of fixed air.

THEY, no doubt, contain a greater quantity of elastic air than common water. To this we may ascribe their briskness and exhilarating effects on the spirits.

IT is the gradual separation of this air, which causes the spontaneous turbidness and precipitation in these waters, after they have stood uncovered for some time. We observe the same phenomena in all impure waters, after they have been exposed to the air, especially in a warm place. I would not be understood to mean, from what has been said here, that iron is not, sometimes, found dissolved in water, by means of the vitriolic acid. The waters of Shadwell and Westwood, in England, and of Hartfell, in Scotland, are of a vitriolic nature, and yield a true sal martis, upon evaporation. But waters of this kind, are by no means so common as some have

have supposed. They are known by changing a piece of blue paper to a red color; and by depositing a blue sediment, by adding to them a small quantity of a fixed alkali, prepared with ox's blood, in the manner directed for the manufactory of Prussian blue.

FROM these Experiments we may explain the cause of the rusting of iron when exposed to the air. It is owing to the water (and not to a vegetable acid) which always floats in the air, acting as a menstruum upon iron.

C H A P. II.

Of the DISEASES in which these mineral waters are proper.

IT is common, among some people, to recommend these waters indiscriminately, in all nervous diseases. It has been the fate of these diseases, to be known in the different ages of physic, by the different names of spleen, vapours, hip and the like. At present they are collected under the general name of diseases of the nerves. When we consider how much these diseases are connected with those which belong to the other parts of the human body: When we consider too, how much they are diversified by their causes; by the age, and the sex of the patient; and chiefly by the two opposite states, of relaxation and tension of the nervous system, perhaps it will appear, that ignorance never found a more ample sanctuary for itself, than when it marked down all those diseases which are various in their symptoms, and difficult of investigation, under the name of nervous. It would require a volume to distinguish and arrange these diseases properly.

properly. I shall only mention the names and characteristic marks of a few of them.

THESE waters are proper in the hysteria. This disorder shows itself in a thousand shapes. It is known by attacking the female more than the male sex; especially such as are of a delicate and weak habit; by being accompanied with flatulences, contractions of the muscles of the belly, and a sense of something resembling a ball rising in the throat. It prevails most in warm climates and seasons; and, lastly, it is always subject to exacerbations from any cause that suddenly affects or disturbs the mind.

THEY are proper in the palsy, whether of part or of the whole body, where the pulse is not full, and where the symptoms of a plethora are wanting. It is always a strong presumption of the propriety of using these waters, where the disease has continued a long time, without any remarkable change in the symptoms.

IN the epilepsy, when it arises from an affection of the stomach, or the womb, or from a general weak habit of body, these waters are proper.

THEY may be drank with advantage in a certain stage of the gout, particularly when it comes on in the decline of life. The constitution then exhibits various marks of great debility. The gouty affection in consequence of this, instead of appearing in the feet, shows itself in a weakness, nausea, and acidity of the stomach.

stomach. These symptoms are generally accompanied with costiveness and flatulency of the bowels.

THEY are useful in an old obstinate diarrhoea, or habitual purgings, when not accompanied with a griping, or a discharge of blood mixed with the stools. Sailors returning from long voyages, or from warm climates, are most subject to this disorder.

THEY afford the most certain relief in all cases of a want of appetite, when it originates from a defect in the stomach. The appetite may be destroyed, by causes which operate, directly or indirectly, upon the stomach. Those which operate directly, are tea, spirituous liquors, and bitters, taken in an immoderate quantity, or at improper times; too full meals; strong vomits; and warm drinks of all kinds: The causes which operate indirectly on the stomach, are, all sedative passions of the mind; such as, grief, fear, love, &c. together, with whatever weakens or disorders the other parts of the system.

WE shall, hereafter, point out what kind of diet should be joined with the mineral waters in this disorder.

THEY are proper in all those colics which arise from mere weakness of the bowels; and particularly in that species which is accompanied with an overflowing of the bile; a disease this, to which the inhabitants of warm climates are most subject.

BESIDES these diseases, in which the nervous system is chiefly affected, these mineral waters are useful in all obstructions of the liver and spleen; whether they are brought on by indolence, intemperance, or intermitting fevers, and whether they show themselves in a mere swelling, and hardness, or a jaundice, a cough, or a dropsey. In the dropsey they should be given, only while they continue to operate by urine or stool; for this purpose they should be drank (not in the usual manner) but in large quantities.

THEY are proper in all cases of the chronic rheumatism. They will be the more efficacious in this disorder, if the flesh-brush be used at the same time.

THEY are very useful in the piles, especially when they occur in that stage of life, in which the arterial plethora yields to the venous. This seldom happens till the thirty-fifth or thirty-sixth year of life.

IN all female obstructions, and weaknesses, which are accompanied with a general languor and debility of the whole system, these waters afford considerable relief.

I HAVE heard of one or two cases, in which they have relieved children afflicted with worms. Here they act like bark, rhubarb, aloes, and bitters of all kinds, *indirectly* upon the worms, by giving a proper tone to the bowels. Among the many substances which destroy them *directly*, there are few more powerful than sugar, honey, salt, and ripe summer fruits. All children show a fondness for these things. The appetites in this early period of life, are not corrupted by habit or vitiated by

disease; and may therefore be listened to, as the voice of nature. These substances should be given upon an empty stomach, and the patient should not eat any thing for an hour afterwards.

THEY are proper in all cutaneous diseases and foul ulcers of long standing, whether they be of a scorbutic or scrophulous nature. The parts affected should be washed with the mineral water twice a day.

THEY are useful in diseases of the kidneys and bladder, when a difficulty or obstruction, in making water, arises from relaxation, or small calculi in these organs. They are justly to be preferred to common spring or pump water, which is seldom so pure, as not to contain some calcarious matters, which are said to increase these complaints.*

THEY have been used, with success, in obstinate gleets, after the most powerful astringent medicines have been used to no purpose.

LET us next enquire, in what diseases these waters are hurtful.

IN the hypochondriac disorder the chalybeate waters are a doubtful remedy. Although this disorder is sometimes joined with the hysteria, yet it is distinct from it in its nature, and requires a very different treatment.

* PERCIVAL'S *Experiments and Observations on Waters.*
Page 14

ment. It is known by its attacking the male more than the female sex; by its prevailing most in cold seasons and climates; and by its being accompanied with acidity, flatulency, costiveness, or a diarrhoea; an intire want of, or an inordinate appetite; pain in the stomach and breast, after eating; a vomiting; an unusual discharge of spittle from the mouth; colic, &c. In this disorder, all preparations of iron have been found hurtful; and although the quantity discovered in these waters be very small, yet I have heard several patients, who laboured under the above symptoms, complain of being worse after drinking them. It is a little extraordinary, that a draught of warm water, will sometimes, create an appetite in this disorder, after bitter and aromatic medicines have been administred to no purpose.

THE chalybeate waters have been sometimes recommended in the phthisis pulmonalis, or consumption of the lungs. It is difficult, perhaps impossible, to tell, in all cases, when a consumption arises from a primary affection of the lungs. A discharge of pus, is not always a sign of an ulcer in these organs. There may be a cough, which is symptomatic, and brought on by a primary disorder of the liver. There may be a discharge of pus from the lungs, owing to their being so relaxed, as to pour forth those parts of the blood, from which, pus, under certain circumstances, is formed. In these cases, the chalybeate waters may perform a cure; but I doubt much, whether they ever cured or relieved a true consumption; whether brought on by an abcess, tubercles, or ulcers. In every state of the human body, when the inflammatory diathesis prevails, these waters are

are improper. That it prevails in the consumption, we infer from the hard pulse, and sify appearance of the blood.

THESE waters, we said, are improper in all diseases where an inflammatory diathesis prevails.

THEY are hurtful therefore in most cases of hemorrhages, or preternatural discharges of blood from the body. Hemorrhages are either active or passive: The former happen before, the latter after, the thirty-fifth or thirty-sixth year of life. It is in the former, in which the inflammatory diathesis chiefly prevails. They are known by an increase of the tone and action of the arterial system, and by all the common symptoms of a plethora.

THESE waters are likewise hurtful, for the same reason, in the acute rheumatism, and gout. This latter disease resembles the former a good deal, in its seat, symptoms, and method of cure, when it attacks in the early part of life. It appears at the usual seasons of inflammatory disorders, and is accompanied with a considerable degree of the inflammatory diathesis. It is now called the *tonic* gout, to distinguish it from that, which comes on in the decline of life, and which, from the irregularity in its seat, times of accession, and symptoms, is called the *anomalous*, or *atonic* gout. These names are sufficient to shew, that we do not look for the immediate cause of the gout in a tartar, chalk, gluten, or in acrid matters of any kind; but, that we presume it to be seated primarily, in the moving solids. It would
be

be easy to multiply proofs of this, drawn, both from the history of the gout,* and the established laws of the nervous system. The methods of treating the tonic and a-tonic gout, should be very different, and it is through a want of attention to these, that so many seeming contradictions are to be found in all the writers upon this subject. In the former, a low diet, consisting, chiefly, of milk and vegetables; an entire abstinence from spirituous

* There is nothing which has strengthened the belief of the gout's being occasioned by matter, more than the opinion of its being hereditary. It seldom appears in those who are descended from gouty parents, till the twentieth or twenty-fifth year of life: Where could a matter of any kind be lodged, during this time, without showing itself? Why do not the changes which the constitution undergoes in this time, evolve it? Where do we find the least resemblance of this, in those diseases, which we are sure depend upon morbid matter? The gout appears to be upon a footing with the consumption and madness, which seldom appear in persons descended from consumptive or maniacal parents, till the body arrives at its maturity. These, no one will pretend to say, are occasioned by morbid matter. A slight catarh, whether from cold or contagion, will bring on a consumption; a trifling agitation of the mind,—madness; and small deviations from temperance will bring on the gout in these people, only because the body is predisposed to them. This predisposition is derived from the original stamina, and depends upon a peculiar form and organization of the solids. It is obvious to the senses in persons descended from consumptive parents.

ous liquors, with moderate exercise, insure a certain cure. This assertion I know will be controverted by many, who believe from tradition, that the gout is always incurable. The only circumstances which can afford us proofs, are a good deal unfavourable to it; for where shall we find an instance, of a young man, with an affluent fortune, in the career of pleasure, who will give up, what he calls, "his friend and his bottle," merely, to avoid one or two fits of the gout in a year, much less, to lay up a stock of health and spirits for old age. But, let us pursue nature in her private walks. Have we not seen people, who were afflicted with the gout in the early part of life, reduced in their circumstances, and by involuntary temperance and labour, afterwards, perfectly cured of it? Instances of this kind, which are to be found in all countries, prove, that the gout is as truly a curable disease, as the rheumatism or the intermitting fever. In the atonic gout, which comes on in the decline of life, and which shews itself in the kidneys, bowels, stomach, lungs, &c. the springs of life are too much worn, to be repaired by a low diet or exercise. The patient here must take wine and solid food in a moderate quantity, in order to keep the disorder in the extremities. It is no more a reproach to our art, to say, that we cannot cure this stage of the gout, than that, we cannot render man immortal. It would be less absurd, to believe all the delusions of Alchemy, than, to expect a medicine to cure the gout in either of its stages, from the animal, vegetable, or mineral kingdoms.

C H A P. III.

Of the manner of using these mineral waters.

THE quantity to be drank daily, of these waters, must be determined by the constitution and disease of the patient. Too large a draught at first, has sometimes produced very disagreeable effects, which have discouraged patients from giving them a fair trial. They should be guarded against this, and in some cases, where the use of them is clearly indicated, they should be encouraged to look upon their harsh operation at first, as a presage of their doing much good. The best method for people of delicate habits, is to begin with a gill or half a pint, and encrease it gradually to five or six half-pints in a day. Formerly, the chalybeate waters were drank in a much larger quantity; but experience has taught us, that three pints, or two quarts at most, in a day, are sufficient to produce all the salutary effects, we have reason to expect from them. The patient has always drank too much, if he becomes very feverish, and perceives an uneasy sense of heat in his breast, immediately after taking the water. He should drink them, if possible, at the fountain head; as their virtue is much impaired, by being deprived of their air. The best time for drinking them, is early in the morning, at noon, and in the evening, upon an empty stomach. The patient should always walk or ride, or use some other gentle exercise, immedately after drinking them. When we want to promote perspiration, they should be drank just before the patient goes to bed.

In some diseases which require these waters, the stomach is oftentimes so weak, as to reject them, even in the smallest quantity. When this is the case, the waters should be mixed with a little cinnamon or mint water, or the stomach should be prepared for them, by some grateful aromatic tincture. I have heard of a lady, who could retain the waters upon her stomach only when she drank them in bed, and remained there an hour or two afterwards. They relieved her of the complaint for which she drank them.

If the waters should not keep the bowels gently open, the patient should make use of such laxative medicines as will best suit his disorder.

They may be drank for several months, in any season of the year, especially in the spring, summer, and autumn. It is a good practice to intermit them now and then, for a few days, least they should lose their efficacy, by habit.

It would encroach too much upon our plan, to mention the particular diet which the several diseases, we have mentioned, require. The patient should observe the most strict regard to the quantity of his food. This caution is the more necessary, as the waters, sometimes, excite an artificial appetite, which it is by no means safe fully to gratify. Four or five small meals, are better than one or two in a day, for valetudinarians, upon the account of their being less stimulating. In all cases of indigestion, acidity, flatulency, &c. in the stomach, patients should abstain from vegetables, and live, as much

as possible, upon an animal diet. Beef and mutton will be found much easier of digestion, in these cases, than what are commonly called the white meats.*

THIS diet should not be continued too long. In proportion as the stomach recovers its tone, the patient should gradually return to the use of vegetables, or to mixed aliment. What Dr. CADOGAN says of milk, we may say of vegetables that it is, generally, a sign the stomach requires them, when it cannot bear them.

IN all cutaneous and scorbutic diseases, foul ulcers, &c. the patient should live entirely upon vegetables, provided he is not very old, or of a very weak habit.

THERE can be no other objection, to patients drinking these chalybeate waters with all their meals, than the danger of their losing their efficacy, by too constant use. The ingenious female author of "l'Histoire, de la Putréfaction," has proved, by experiment, that they hasten the dissolution and putrefaction of aliment.

IT is a common question, for patients to ask their physicians, which of the three mineral waters we have de-

* *En effet, plus un animal est jeune, plus il tient du végétal, & moins il tend par consequent à la corruption. A mesure qu'il vieillit, il perd de cette qualité, parce que tout tend dans la nature à l'alkalescence. Il devient donc plus susceptible de putréfaction.*

Essai pour servir à l'histoire de la putréfaction. Page 25.

scribed, is the best. The substances, contained in each of them, being nearly the same, in proportion and quality, the difference in their strength may be rendered equal, by the quantity drank, or by mixing them with common water. That water will do most service, where the patient can enjoy the benefit of exercise, proper diet, a pure air, agreeable company, and an entire relaxation from business, to the greatest advantage. Abington and Bristol, therefore, will always have the preference for the chief of these articles, to Philadelphia. Bristol, for these several years past, has been in great repute. I am furnished with a number of well authenticated cases, drawn up by Dr. DENORMANDIE, an able physician at Bristol, in which the water of this place, joined with a proper regimen, in diet and exercise, has performed some very remarkable cures. The following just account of the village, bath, &c. of Bristol, was written by the above gentleman.

" The public being thus informed of the real qualities and contents of these waters, founded on experiments; it may not be amiss, to add a description of the springs, and the conveniences with which the sick may be furnished, during their resort to the Bath. The waters are distant half a mile from the borough of Bristol, which lies on the shore of the river Delaware, opposite to Burlington, and about twenty miles from Philadelphia; the houses, about fifty in number, are situated on a high, and dry sandy bank of the same river, whose shore is bold and gravelly, which renders the borough remarkably healthy, notwithstanding the contrary has been reported, and thence become almost a popular

lar error; good lodgings, and other accommodations, may be had at a reasonable rate; the post thrice in every week, and a stage-waggon every day, Sundays excepted, during the summer season, pass through the village, which daily present, to the sick, an opportunity of corresponding with their friends throughout the continent. The roads for ten miles distance, leading either to Philadelphia, or New-York, are the best in the province, which, with a road, leading along the banks of Nishaminy, afford most agreeable opportunities of riding, either in carriages or on horseback, to such of the sick as may be directed to use those kinds of exercise. The inhabitants of the borough are constantly supplied, with all kinds of butchers meat, poultry, and vegetables.

“ **T H E** Baths, for the time, are so improved, as to render them convenient and useful. A room forty-four feet long, is compleatly finished, between the pump room and the room for bathing; here, whilst the baths are preparing, and during the time of drinking the waters, every morning, which generally takes up half or three quarters of an hour, the company amuse themselves, in a manner the most agreeable, and have an opportunity of walking (an exercise, during that time, essentially necessary) free from every inconvenience, arising from an exposure to the open air.

“ To the northward, and adjoining this long room, is the pump, inclosed in lattice work, and so situated, that the drinkers are immediately supplied with the water through a small door made in the partition, between the
long

long room and the pump, by a person attending for that purpose.

"THE Baths are in separate rooms, at the south end of the long room, one for ladies and another for gentlemen, with dressing apartments to each of them. They contain four hundred and sixty gallons each, and are filled in five minutes, by pumps immediately over the principal spring, which, by the most exact observation, are found to yield one hogshead of water in five minutes. After bathing, the water is let off, and conveyed away by pipes under ground, so that every bather may be supplied with fresh water, without being delayed but a few minutes."

AFTER all that has been said upon this subject, we must acknowledge that mineral waters, like most of our medicines, are only substitutes for temperance and exercise in chronic diseases. An angel must descend from heaven, and trouble these chalybeate pools, before we can expect any extraordinary effects from their use alone. There is a great resemblance between the fate of medicine and religion. In every age and country, an article of faith, or a mode of worship, have usurped the place of the precepts of morality. Thus, in medicine, we find a variety of remedies, such as mercury, bark, steel, woodlice, tar, lime, and, mineral waters of all kinds, pine buds, ginseng, &c. have been put in the place of temperance and exercise. The fashion of the former passes away, but the effects of the latter, like the obligations of morality, endure for ever.

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